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FLEISCHER'S "VOLUMETRIC ANALYSIS"

A System of Volumetric Analysis. By Dr. Emil Fleischer. Translated by M. M. Pattison Muir, F.R.S.E. (Macmillan and Co., 1877.)

THERE is no question that volumetric analysis does not yet play that important part in quantitative chemical analysis which it merits, and which on the appearance of Mohr's well-known "Titrirmethode" it was confidently anticipated that it would assume. The method of instruction commonly pursued in many of our large public laboratories is in a great measure to be blamed for this result. It is, of course, necessary that the student should be put through a thorough course of gravimetric analysis, in order that he may attain that manipulative dexterity without which he cannot hope to become a successful operator, and perhaps no branch of practical chemistry is better calculated to afford the requisite training and practice than the somewhat tedious process of weight analysis, with its innumerable separations, filtrations, washings, and weighings. But however excellent may be their educational value, and however accurate their results, there is no doubt that many of the gravimetric methods at present in common use when viewed as practical processes for every-day application, fall very far short of what is required of them. It not unfrequently happens that the busy chemist, uncertain whether a lengthy analysis will afford him, after all, the requisite information, hesitates to incur what he fears may turn out to be a useless sacrifice of valuable time, and hence, from the want of rapid and sufficiently accurate analytical methods, many weighty facts may have been, doubtless actually have been, overlooked. Indeed, it is a question whether some of these analytical processes have not done as much to retard the progress of chemical science as to advance it. The majority of chemical workers, especially those engaged in scientific research, have not made analysis a special study, and hence when they are under the necessity of making a particular determination, they are content with the time-honoured processes which they have learned in the course of their laboratory-training. It is only by the appearance of such works as the one before us that the greater number of chemists are made aware of the advances which quantitative chemistry has really made.

Mr. Muir has done a very considerable service to his chemical brethren by his translation of Dr. Fleischer's work, for if we are not mistaken, it is the first attempt at a rational system of volumetric analysis which has been offered to us in this country. The work is divided into three distinct parts. In Part I., which treats of the volumetric method, we have, in Section I., an account of the principles on which this branch of the art of analysis rests. The several forms of burettes, pipettes, and measuring flasks recommended by the author, are described, together with the methods for their calibration and verification. The modes of preparing and standardising the normal solutions are next described. Section II. treats of the ordinary alkalimetric and acidimetric processes. Section III. gives an account of the various methods depending upon oxidation and reduction; these are respectively designated as oxidimetric and iodometric methods. Lastly, in Section IV., we have a description of the more important precipitation methods, *e.g.*, Mohr's method of determining chlorine by standard silver solution, and Wildenstein's process for estimating sulphuric acid by a standardised solution of potassium chromate. There is little in this part which calls for special remark; we would, however, point out that in the discussion on experimental errors, the magnitude of which, as the student is vaguely informed, may in certain cases be calculated by the mathematical method of least squares, it is not very apparent from the description how certain of the errors are eliminated. Dr. Fleischer's language is either not very clear on the subject, or his translator has failed to catch its exact meaning. The account of a method of verifying a pipette given on p. 23 will be apt to puzzle a beginner, on account of the unfortunate confusion between burette and pipette. We fail to see the necessity for the retention of the Réaumur scale of temperature in a work intended for English readers; and we are constrained to protest, with all possible energy, against the introduction of a new standard of temperature. What particular significance has 14°·5 R. to us in this country? If we are not content to take the melting-point of ice or the point of maximum density of water as our standard, let us at least maintain our credit as a law-abiding people by conforming to the enactments of our Legislature. In these respects Mr. Muir has undoubtedly sacrificed his independence to his loyalty to his author.

Unquestionably the most distinctive feature of the work is seen in Part II.; indeed, this constitutes a most valuable addition to the art of chemical analysis. In this part the author describes a variety of volumetric processes by means of which a large number of acids and bases may be determined, either separately or when mixed. He has not attempted to describe all the methods which have been proposed for the determinations of the several constituents, but has given only those which he has himself found to be reliable and capable of general application. In Section II. of this part it is shown how each base may be determined by volumetric methods without previous group-separation. The substance to be analysed is obtained in solution by the appropriate methods (which are fully described), and is divided into as many portions as there are constituents to be determined. As the author tells us, "the process of analysis is thus much shortened, not only by the omission of group-separations, but also by the fact that but one or two filtrations at the most are necessary; in many instances no filtrations are required. The precipitates do not require the same long-continued washing which consumes so much time in the ordinary processes. Two circumstances more especially recommend the methods under consideration. Every estimation is readily controlled by repeating the process on the original liquid; the analyses of technical products in which one or more, but not all, of the constituents is to be determined, becomes a matter of ease, and can be carried out much more rapidly than when it is necessary to make a systematic separation of the metallic groups.' Lastly, in Part III. it is shown how these methods are applied to the analysis of a number of important techni-

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cal products such as potashes, soap, gunpowder, bone-ash, superphosphates, metallic ores, alloys, &c.

We cannot close this notice of a book which is really a solid contribution to chemical literature without referring to a circumstance which greatly detracts from its value; indeed, we fear that in many cases it may prevent the recognition of its great merit. Dr. Fleischer, like the great apostle whose worthy disciple he is, praises the times which are past; he is of opinion that our modern system of notation is founded on the most daring hypotheses, and he believes that the distressing complexity which the formulæ erroneously styled "modern" have produced, and the phraseology which has accompanied them, far outweigh any slight advantage which they have bestowed upon science; he thinks that such formulæ, "even supposing that there is a 'shadow of a reason' for their existence as Mohr trenchantly remarks, are peculiarly unfitted for analytical chemistry and for mineralogy." *O tempora, O mores!* With such convictions we are not surprised that Dr. Fleischer should have insisted on the retention of the old formulæ, although he has not actually prohibited the introduction of the newer notation in the translation. Mr. Muir has something to say for himself on this point; we entirely agree with him that the objections raised by the author have been answered times without number. *Il sabio muda conscio.* We hope therefore that, should a second edition be called for, Dr. Fleischer may be persuaded to put the work more in harmony with the time; we feel bound to say that had he done so in the outset the appearance of this second edition might have been considerably accelerated. T.

HARTLAUB'S BIRDS OF MADAGASCAR

Die Vögel Madagascars und der benachbarten Inselgruppen. Ein Beitrag zur Zoologie der äthiopischen Region. Von G. Hartlaub. Pp. 425, 8vo. (Halle: Druck und Verlag von H. W. Schmidt, 1877.)

NOTHING can be more conducive to the progress of zoological science in any country than the issue of handbooks of the different branches of its fauna in a cheap and convenient form. Such publications bring home to a multitude of observers a *résumé* of the facts previously known only to a few, and such as are too often scattered over the pages of periodicals and other works which can only be consulted in an extensive library. Those who are acquainted with the vast advance made towards our knowledge of the Birds of India since the issue of Dr. Jerdon's Handbook will readily admit the truth of what we say and many other examples might be adduced of the beneficial effects of similar publications.

Dr. Hartlaub's "Birds of Madagascar," although an excellent and original scientific work, is quite of the "Handbook" character—that is it gives us a *résumé* of all that is yet known concerning the Avifauna of Madagascar and the appendent islands in a cheap and portable volume—such as may be conveniently carried in the hand of any naturalist visiting those regions. Fifteen years ago Dr. Hartlaub issued a volume of similar character,[1] but much smaller in dimensions. To understand how great has been the advance lately made in our knowledge of the birds of these regions, we have only to compare the "Ornithologischer Beitrag" of 1861 with the "Vögel Madagascars" of 1877. Since the publication of the former work Holland has sent forth Pollen and Van Dam, France Grandidier, and England Crossley and Newton, into that rich and still imperfectly explored field, from which every one of them has reaped an abundant harvest.

The "Lemurian Avifauna,"[1] according to Dr. Hartlaub, is now known to contain 284 species of birds. Of these 220 are found in Madagascar itself, and 104 out of these 220 are absolutely restricted to that island. Moreover, of these 104 birds not less than ninety are so abnormal in structure that it has been found necessary to refer them to peculiar genera. Compared with Madagascar itself the appendent island groups are poor in species, although in every case there are many interesting forms amongst their winged inhabitants. The Comoro Islands muster only some forty-four species[2] of birds, Mauritius about sixty, of which fifteen or sixteen have been introduced by man's agency, and Bourbon about the same number, while Rodriguez appears to have only about twenty-five species now existing in it, of which four or five are certainly recent introductions. But we cannot speak of the recent ornithology of these islands without a passing allusion to the singular forms—now mostly known to us by their fossil remains—which have become but very recently extinct, and the gradual rediscovery of which must ever rank among the most interesting scientific achievements of the present epoch. Besides the Dodo of Mauritius and its brother, the *Pezophaps*, of Rodriguez, we now know that divers curious parrots (*Necropsittacus* and *Lophopsittacus*) and extraordinary rails (*Miserythrus* and *Aphanopteryx*) lived in those islands not long ago, and that other strange fowls were found in the same company. Two of the remarkable forms of the Mascarene Islands (*Coracopsis mascarina* and *Fregilupus varius*) have indeed become exterminated so recently that examples of their skins are still to be found in some of our older museums.

Let us now see what Dr. Hartlaub's conclusions as to the general facies of the avifauna of Madagascar and its appendent islands point to.

"Many years ago," he tells us, "the late distinguished naturalist, Isidore Geoffroy St. Hilaire, remarked that, if one had to classify the island of Madagascar exclusively on zoological considerations, and without reference to its geographical situation, it could be shown to be neither Asiatic nor African, but quite different from either, and almost a fourth continent. And this fourth continent could be further proved to be, as regards its fauna, much more different from Africa, which lies so near to it, than from India, which is so far away. With these words, the correctness and pregnancy of which later investigations tend to bring into their full light, the French naturalist first stated the interesting problem for the solution of which an hypothesis based on scientific knowledge has recently been propounded.

"For this fourth continent of Isidore Geoffroy is Sclater's 'LEMURIA'—that sunken land which, containing parts of Africa, must have extended far eastwards over

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[1] "Ornithologischer Beitrag zur Fauna Madagascars. Mit Berücksichtigung der Inseln Mayotte, Nossi-Bé und St. Marie, sowie der Mascarenen und Seychellen." 8vo. Bremen: 1861.

[1] Madagascar and its islands were proposed to be called Lemuria, in 1864, by Sclater, as being supposed remnants of the old "Terra Lemurum," wherein this peculiar form of mammalian life had its origin. The name has been adopted by Haeckel and other writers on Distribution.

[2] Since Dr. Hartlaub's work was published, an important addition has been made to the Avifauna of the Comoros by Mr. Edward Newton, in his memoir of the birds of the Island of Anjuian. (P.Z.S. 1877, p. 295 *et. seqq.*)

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